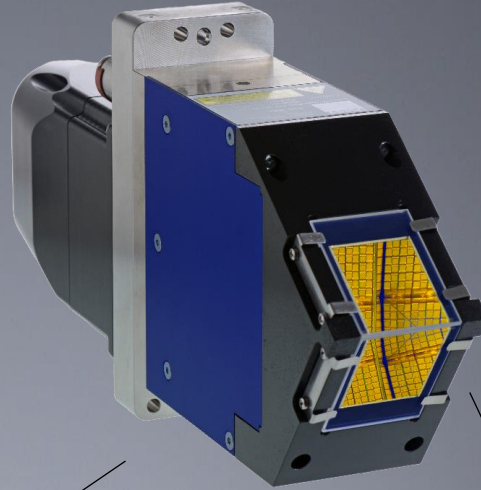


VCSEL solutions

High Power Infrared Sources for Composite Manufacturing



Scalable

Application specific kW
range output

Precise control

Tailored solution by individually
addressable emission zones

Cost
sensitive

Fast processing

Thanks to high power density

Easy to integrate

Compact and robust design

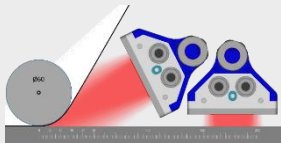
Scalable and flexible high power solutions for fiber placement and tape laying processes

The compact and powerful TRUMPF VCSEL laser sources are designed for the specific requirements of fiber placement / tape laying applications. They deliver directed and controlled infrared power and enable high productivity in narrow and wide layup width process configurations. TRUMPF Photonic Components is producing industrial laser sources based on VCSEL (Vertical Cavity Surface Emitting Laser) micro laser arrays.

The robust and reliable laser modules deliver directed large-area beams of infrared power and are easily integrated into industrial heating applications and production processes. An electronic driver system enables precise power control and fast switching. As a unique feature, individual emission zones of the source can be controlled independently. Thereby dynamic programming of the spatial heating pattern is possible, enabling an unprecedented level of process flexibility and control.

PPM412-12-980-24-C

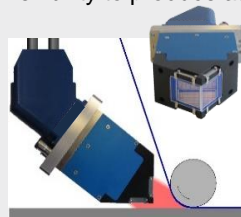
Based on the standard PPM412 industrial range of laser modules, a more compact version of the 2.4 kW module was developed, where the electrical power connector was moved to the end of a cable attached to the module. Performance data and specifications, besides geometry and electrical interface, are the same as for the standard PPM412-12-980-24 laser module. Because of the minimized size, the laser module can be mounted in very restricted geometries. In addition, tape laying configurations with two laser modules are possible, as shown in the illustration on the right. Here, one module is pre-heating a metal substrate and a second module delivers the heat for the consolidation process.



Configuration example for multi-material layup

PPM417-10-980-20

The new PPM417 laser module is optimized for the specific process boundary conditions of fiber/ tape-placement applications. It is extremely compact, with only 49 mm width, and delivers more than 2 kW of infrared power from five VCSEL emitters. The module is typically equipped with a concentration optics for 25 mm tapes, thereby enabling layup of narrow 3D forms. The high power density of more than 100 W/cm² enables fast placement speed for various types of fibers and tapes, including thermoplastic materials with high melting temperature. Besides using a single unit, stacking of many of the laser modules is possible, supporting applications of wide layup width and high productivity. Because of the dynamic programming of the spatial heating profile, in such a configuration still the flexibility to produce at narrower layup width is maintained.



2.0 kW VCSEL with concentration optics and two protective front glasses

PPM412 High Power Laser System - Typical Data

PPM412 laser systems can be scaled from small to large treatment width and up to several ten kilowatts infrared output power.

Laser Module		PPM412-12-980-24-C	PPM417-10-980-20
Optical power	kW (cw)	0.1- 2.4	0.1 – 2.0
Emission area	mm ²	40 x 52	47 x 26
Distinct emission zones		12	10
Power density ¹⁾	W/cm ²	typ. 115	typ. 140
Wavelength	nm	980 ± 20	
Optics		none (lens optional)	26 mm mirror concentrator
Protective front glass ²⁾		borosilicate, anti-reflex coated	
Electrical interface		industry standard power connectors	
Module size ³⁾	mm	W87 x H48 x L108	W49 x H133 x L270

Driver Unit

Number of driver racks	1 x PPD007
Laser control	typ. 10ms time constant, individual control and fault monitoring of laser zones
Machine communication	Ethernet-based (EtherCAT® protocol)
Mains voltage	3 phases 400V (±10%), 47-63 Hz
Mains supply unit (option)	mains connection unit with safety circuit

¹⁾ at emission aperture ²⁾ outer glasses user-replaceable ³⁾ without connector

For more information visit
www.trumpf.com/s/VCSEL-solutions



Safety information:

The products contain laser arrays that can emit invisible high power laser radiation of class 4, which can cause serious injury. The machine manufacturer is responsible to fulfill the relevant laser-related and other safety regulations.

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